

**Title: TWIST LID FOR INSULATED BEVERAGE CONTAINER**

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### **TECHNICAL FIELD**

10 The invention relates to removable lids for beverage containers. More specifically, the invention relates to a selectively openable twist-type lid for an insulated beverage container.

### **BACKGROUND OF THE INVENTION**

15 Thermally insulated beverage containers have become increasingly popular with the public for use with hot beverages, such as coffee. Containers of this type may also be used for cold beverages as well. Hot beverages, such as coffee and tea, impose the most demanding thermal requirements on such a container. As a result, consumers have come to appreciate that double walled, vacuum insulated containers perform this function best. Such containers have sidewalls often manufactured from metal, particularly stainless steel to withstand the high mechanical loading due to atmospheric pressure. Thermally insulated beverage containers designed for keeping cold beverages from becoming warm typically place a lower thermal load on the beverage container. As a result, such containers are often manufactured with a plastic double wall, wherein the interstitial space between the inner and outer walls is either thermally insulated with air or a foamed material.

25 In either case, it is highly desirable to provide a selectively openable lid for the beverage container. The lid performs at least two functions, the first of which is to prevent the beverage from spilling out of the container when the user is not actually drinking the beverage. This feature is particularly important when a hot beverage is

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0 in the container so as to prevent the user from becoming  
burned if the container tips over. As a second function,  
the lip should provide for drinking the fluid at a  
continual rate to prevent splashing or dribbling when the  
beverage is being drunk from the container. The lids for  
5 such containers are therefore typically provided with an  
open position, a closed position, and a third position in  
which the lid can be removed from the beverage container  
for cleaning. An example of a travel mug having a three-  
position, rotatable lid of the type described above is  
10 disclosed in United States Patent No. 5,249,703 to Karp.  
That patent discloses a travel mug having two inwardly  
directly circumferential ears defining a gap region  
therebetween. A rotatable lid, having radially directed  
arms emanating from a central region at the bottom of the  
15 lid are adapted to pass through the gaps in the ears, and  
when rotated with the lid engage an underside of the  
circumferential rim of the lid with the radially inward  
directed ears. The rim is provided with diametrically  
opposed apertures to permit fluid to egress from the mug  
20 while air enters in through the remaining aperture to  
equalize pressure within the mug. The disclosure of this  
patent is incorporated herein by reference. One  
particular problem with this prior art design is that the  
drinking vessel must be specially manufactured with  
25 dedicated structure to engage the arms of the lid. In  
addition, although the lid is substantially splashproof  
when the lid is in the closed position, it is not  
leakproof if the mug is tipped over.

It has become increasingly common for users to employ  
30 thermally insulated beverage containers, particularly of  
the type best adapted for insulating hot beverages such as  
coffee, in moving vehicles, such as automobiles. One  
design branch in the prior art has attempted to provide a  
lid for such containers which is easily operated by a  
35 single hand between an open and closed position so that  
the user does not inadvertently spill a hot beverage on

0 herself while driving her car. Lids of this type often  
employ a push bottom mechanism having a normally closed  
position. Examples of such prior art devices are shown in  
the following patents: U.S. Patent No. 4,303,173 to  
Nergard; U.S. Patent No. 3,964,631 to Albert; U.S. Patent  
5 No. 3,967,748 to Albert; and U.S. Patent No. 4,099,642 to  
Nergard. With respect to the lids disclosed in the above-  
identified patents, the user typically depresses a button  
near the rim of the lid to remove a stopper-like device  
from an aperture in the lid. Releasing the button returns  
10 the stopper to its normally closed position. Although  
devices of this type perform their intended function well,  
they have a significant unanticipated drawback.  
Specifically, the position of a stopper in a normally  
closed position provides an ideal breeding ground for  
15 bacteria in the junction between the stopper and the lid  
drinking aperture. In order to properly clean a lid of  
this type which quickly becomes fouled with such bacterial  
growth, the user must manually clean the lid by holding  
the mechanism open while using a brush or the like. It  
20 has been found that merely placing such lids in a  
dishwasher or the like will not adequately clean the area  
of contact between the stopper and the lid. Most users of  
this type of device find the requirement to manually wash  
the lid so inconvenient that they frequently will not  
25 purchase a second product of the same design.

Therefore a need exists for a splashproof and  
leakproof lid for an insulated beverage container which  
provides a truly leakproof and spillproof design in both  
an open and closed position, which does not encourage  
30 bacterial growth between moveable parts of the lid, and  
which is easily cleaned by the user.

#### SUMMARY OF THE INVENTION

35 It is therefore an object of the present invention to  
provide a removable lid for an insulated beverage

0 container having leakproof and spillproof open and closed positions.

It s yet another object of the invention to provide the above-described object with a removable lid which does not encourage bacterial growth between moving parts of the  
5 lid.

It is yet another object of the present invention to achieve the above objects in a removable lid which is easy to clean.

The invention achieves these objects, and other  
10 objects and advantages which will become apparent from the description which follows, by providing a selectively openable lid for a drinking vessel having relatively rotatable base and cap members. Each member has drinking and venting apertures that are rotatably alignable with  
15 respect to one another to form a first, closed position and a second, open position. Fluid seals between the base and cap member provide substantially leakproof fluid conduits between the respective venting and drinking apertures in the base and cap members when the members are  
20 in the second, open position, and isolate interstitial areas between the members from the drinking and venting apertures in the base member when the members are in their first, closed position.

An alternate embodiment of the invention provides a  
25 structure to delimit the relative rotation of the cap and base members to the first and second positions described above, as well as to a third position in which the cap and base members are disengagable so that they may be cleaned by immersion in a dishwasher or the like without the need  
30 for an individual to physically maintain the members in a separate condition against spring pressure or the like. The lid can also be provided with a detent mechanism to discourage inadvertent relative rotation of the members from the second, open position to the third, disengaged  
35 position. The base and cap members are preferably provided with corresponding bayonet ears for relative

0 rotational engagement therebetween. In addition, a rotational bearing in the form of a spindle and arbor can be provided to guide the relative rotation of the cap and base members.

5 The cap and base member can be provided with substantially any external geometric appearance, however a circular appearance is preferred to coincide with the substantially circular cross-sectional dimension of most beverage containers. In addition, the cap member is preferably provided with a depressed central region to  
10 form a drinking basin for the user.

#### BRIEF DESCRIPTION OF THE DRAWINGS

15 Figure 1 is an isometric, perspective view of the selectively openable lid of the present invention in use with a generic drinking vessel.

Figure 2 is a top plan view of the lid in a closed position.

20 Figure 3 is a top plan view of the lid in an open position.

Figure 4 is an exploded, isometric view of base and cap members of the invention.

25 Figure 5 is a bottom plan view of the cap member of the invention.

Figure 6 is a top plan view of the base member of the invention.

Figure 7 is a cross-sectional, side elevational view of the lid taken along lines 7-7 of Figure 3.

30 Figure 8 is an enlarged, partial cross-sectional view of the circled area indicated in Figure 7.

## 0 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A three-position, selectively openable lid is generally indicated at reference numeral 10 for use with a thermally insulated beverage container 12, as shown in Figure 1. The lid 10 has substantially circular cap and base members, generally indicated at reference numerals 14 and 16 in Figures 4, 5 and 6. The cap and base members each have corresponding drinking apertures 18, 20 and venting apertures 22, 24. The cap and base members 14, 16 are relatively rotatably moveable with respect to one another from a first closed position shown in Figure 2, wherein the cap member drinking and venting apertures 18, 22 and the base member 16 drinking and venting apertures 22, 24 are out of respective registration with one another, to a second, open position shown in Figure 3 wherein the apertures are in registration with one another due to rotation of the cap and base members in a clockwise direction 26 of approximately 30 degrees. The cap and base members are also moveable to a third, disengaged position shown in Figure 4 by further rotating the cap member with respect to the base member in the clockwise direction an additional 30 degrees.

As will be apparent to those of ordinary skill in the art, when the lid 10 is in the first closed position shown in Figure 2, a user may not drink from the beverage container 12, whereas when the lid is in the second open position, shown in Figure 3, the user may drink from the beverage container 12. The user may also separate the cap and base members 14, 16, as shown in Figure 4, for cleaning, such as in a dishwasher.

The cap member 14 has an inwardly tapered and downwardly directly circular sidewall 30, defining a depressed drinking basin 32 having an upper surface 34 and a lower surface 36, defining the drinking and venting apertures 18, 22. The cap member 14 also has a downwardly depending external, circumferential flange 38, having a

0 knurled region 40 for grasping the cap member and rotating  
the same with respect to the base member 16. As best seen  
in Figures 4 and 5, the cap member sidewall 30 has on its  
outer side diametrically opposed and laterally extending  
5 bayonet ears 44, each subtending an angle of approximately  
60 degrees. The lower surface 36 of the cap member also  
supports a downwardly directed, cylindrical projection or  
spindle 46, for guiding relative rotation of the cap and  
base members 14, 16. The external flange 38 of the cap  
10 member 14 supports a downwardly directed, arcuate  
projection or timing cam 48 for limiting relative rotation  
of the cap and base members 14, 16. The timing cam  
subtends an angle of approximately 22.5 degrees.

As best seen in Figures 4, 6 and 7, the base member  
16 has a substantially circular sidewall 52 having  
15 external threads 54 adapted for mating with corresponding  
threads (not shown) on an inside surface of the beverage  
container 12. The sidewall 52 has, at an upper end  
thereof, a circumferential rim 56 which supports an O-ring  
58 on the underside of the rim for forming a fluid-tight  
20 seal with the beverage container 12. The sidewall 52 also  
defines a substantially flat, depressed floor region 60  
which defines the drinking and venting apertures 20, 24.  
An upper surface of the floor region also defines a  
depressed central arbor 62 having sidewalls which form a  
25 bearing surface for the spindle 46. The arbor, itself,  
has a floor 64 to prevent fluid from the beverage  
container from passing into the upper surface of the floor  
region 60 other than through the drinking or venting  
apertures 20, 24.

30 As best seen in Figures 4 and 6, the rim 56 of the  
base member 16 also has first and second delimiting stop  
members 66, 68 which project upwardly from the rim. The  
stop members are separated by an angular distance of  
approximately 145 degrees and form a receiving channel 70  
35 for the timing cam projection 48. When the cap member 14  
is rotated clockwise from the first closed position as

0 shown in Figure 2, through the second open position as  
shown in Figure 3, to the third, disengaged position shown  
in Figure 4, the timing cam 48 has its trailing edge 72  
initially in contact with the second delimiting stop  
member 68 until the timing cam's leading edge 74 comes  
5 into contact with the first delimiting stop member 66. As  
defined herein, the "leading edge" of a structural member  
is defined as the surface which is first encountered when  
the cap member 14 is rotated in a clockwise direction as  
shown in Figures 1 through 3. The receiving channel 70 is  
10 provided with a ramp-like detent structure 76 located  
approximately one-third of the distance from the second  
delimiting stop member 68 to the first delimiting stop  
member 66. The detent structure 76 discourages  
inadvertent rotation of the cap member 14 in a counter-  
15 clockwise direction from the second open position to the  
third, disengaged position unless the user imparts  
sufficient torque to the cap member to resiliently deform  
the timing cam 48 so that it may pass over the detent  
structure 76.

20 In contrast to the symmetrical, diametrically opposed  
bayonet ears 44 on the cap member 14, the base member 16  
has first and second inwardly directed bayonet ears 80,  
82 on an inner surface of the circular sidewall 52. The  
leading edges 84, 86 of the bayonet ears 80, 82 are  
25 diametrically opposed with respect to the center of arbor  
62. However, the first bayonet ear 80 subtends an angle  
of approximately 60 degrees, whereas the second bayonet  
ear 86 subtends an angle of approximately 30 degrees.  
Thus, the trailing edges 88, 90 are not diametrically  
30 opposed. This asymmetrical structure permits the cap  
member 14 to be released from the base member 16 when the  
timing cam leading edge 72 is in contact with the first  
delimiting stop member 66.

As best seen in Figures 6 and 8, the base member 16  
35 is provided with a venting aperture seal 100 and a  
drinking aperture seal 110. The seals are preferably



0 manufactured from food grade silicon or rubber and are in  
the shape of an arcuately deformed figure-8. One portion  
of the figure-8 portion of each seal circumscribes the  
respective drinking or venting aperture. The remaining  
5 areas 112, 114 of the floor region 60 of the base member  
16. As will be apparent to those of ordinary skill in the  
art, when the cap and base members 14, 16 are in the  
first, closed position as shown in Figure 2, the drinking  
and venting apertures 20, 24 of the base member 16 are in  
10 registration with the smooth, lower surface 36 of the cap  
member 14, which are surrounded by portions of the figure-  
8 shaped seals 100, 110. Thus, the lower surface 36 of  
the cap member 14 and substantially all of the floor  
region 60 of the base member 16 remain uncontaminated by  
15 fluid from the drinking vessel 12. Similarly, when the  
cap and base members 14, 16 are in the second, open  
position shown in Figure 3, the drinking and venting  
apertures 18, 20 and 22, 24 are in registration and also  
surrounded by closed portions of the seals 100, 110.  
20 Thus, the lower surface 36 and floor region 60 also remain  
uncontaminated by fluid in the beverage container 12 when  
a user is drinking therefrom. The assignee of the present  
invention has discovered that by fluidly isolating the  
drinking and venting apertures from the remaining  
25 structure of the lid 10, the lid remains substantially  
sanitary for much longer periods of time as compared to  
prior art designs. Eventually, when it is necessary to  
clean the respective parts of the lid, the user can easily  
disassemble the lid as shown in Figure 4 and place the  
30 parts in a dishwasher or the like for cleaning and  
sanitization.

In view of the above, the cap and base members 14, 16  
are preferably manufactured from a food grade thermo-  
plastic elastomer such as acrylonitrile butadiene styrene  
35 (ABS) or another suitable injection molded polymer. The  
seals 100, 110 and the O-ring 58 are preferably

0 manufactured from food grade silicon, rubber or another  
suitable material. The knurled region 40 is preferably a  
rubberized material adhered to or ultrasonically welded  
onto the external flange 38.

Another feature of the invention is disclosed in  
5 Figure 8. The invention provides for gradual release of  
pressure when the lid 10 is rotated from the closed to  
open position. Such pressure may undesirably form inside  
the drinking vessel 12 when there is a drop in ambient  
temperature while the lid is in the closed position and a  
10 hot beverage is stored in the vessel. If the vessel is  
full, some of the fluid may be undesirably ejected from  
the venting aperture 22. To provide a circuitous path for  
release of such pressure, the venting aperture 22 is  
provided with a lower, arcuate depression or rebate 120.  
15 The rebate has a depth of approximately one-half of the  
thickness of the drinking basin 32 and has a length of  
approximately one-quarter inch. As best seen in Figure 6,  
the rebate 120 and venting aperture 22 are preferably  
totally circumscribed by the portion of seal 100 which  
20 encloses empty area 112 when the lid 10 is in the closed  
position. When the lid is rotated towards the open  
position from the closed position, the rebate 120 clears  
the empty area 112 sealed venting aperture seal 100 first.  
This provides a small, indirect venting pathway from  
25 inside the vessel 12 to outside of the vessel to gently  
release any such pressure.

Other alternate embodiments of the invention are  
contemplated which will be apparent to those of ordinary  
skill in the art upon reviewing the above disclosure. For  
30 example, the seals 110, 112 can be placed on the lower  
surface 36 of the drinking basin 32 while the floor region  
60 of the base member 16 can be made substantially smooth.  
In addition, the orientation of the bayonet ears described  
above can be reversed with the symmetrical bayonet ears  
35 being positioned on the base member 16, and the  
asymmetrical bayonet ears being placed on the cap member

- 0 14. The timing arrangements of the stop members 66, 68,  
timing cam 48, and relative positions of the drinking and  
venting apertures can all be rearranged in accordance with  
the design choice of those of ordinary skill in the art  
in accordance with the concepts of the invention as  
5 discussed above. Therefore, the invention is not to be  
limited by the above disclosure but is to be determined in  
scope by the claims which follow.